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BUREAU OF
ENTOMOLOGY AND PLANT QUARANTINE
NEWS LETTER

VOLUME III

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MAY 1936

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ADMINISTRATION

Grasshopper control campaign.--On June 24 the President approved a Joint Resolution, passed the last day Congress was in session, providing an appropriation of $250,000 for a cooperative campaign for grasshopper control. The amount is not sufficient to provide bait in all areas where grasshoppers occur in outbreak numbers. In many sections grasshoppers have moved into the fields and fully effective control cannot be expected; however, by the prompt utilization of the bait, protection can be given to crops in certain areas. The appropriation will be used for the purchase of bait materials and for their distribution to appropriate centers in the infested areas, where State agencies and farmers will be responsible for mixing the bait and for its local distribution and utilization. Field headquarters for the work have been established at Kansas City, Mo., under the direction of P. N. Annand.

Investigations in Puerto Rico to continue.--Studies were begun last summer on a number of insect problems in Puerto Rico. It was contemplated that the work would be concluded by the end of the fiscal year. After the Supreme Court decision of January 6 on the A. A. A., restricting the use of Processing Tax funds, the activities were curtailed for about 3 months, but were continued later under a special appropriation. With the interruption, it was impracticable to carry out all the work planned, and the remainder of the special appropriation will be used to continue certain activities during part of the next fiscal year. Investigations on the following problems are being concluded with this fiscal year: The relation of ants to scale insects attacking coffee, conducted by M. R. Smith; studies on insect vectors of sugarcane diseases, by S. R. Vandenberg, F. M. Wadley, and H. D. Tate; studies on insects attacking corn, by B. A. App, under the direction of S. R. Vandenberg; mosquito studies by G. S. Tulloch; and explorations for natural enemies, by S. M. Dohanian. The studies on the Puerto Rican mole cricket were terminated in April, when A. H. Madden was transferred to Quincy, Fla., to assist in investigations on tobacco insects. Investigations on the following problems are not to be concluded at this time: Colonization of natural enemies, by K. A. Bartlett; studies on cotton insects, particularly the pink bollworm, by L. C. Fife; on the rhinoceros beetle attacking coconuts and mealybugs on pineapples, by H. K. Plank; on bean pod borers and onion thrips, by L. B. Scott; and on the horn fly and screw worm, by H. L. Dozier. The investigations on fruit flies will be continued without reduction at least for the first quarter of next fiscal year.

FRUIT INSECT INVESTIGATIONS

Results with codling moth bands.--M. A. Yothers, of the Yakima, Wash., laboratory, reporting on last season's work with chemically treated bands for codling moth control, states that the tests included comparisons of different loads of beta-naphthol and oil, of cold-treated and hot-dipped bands, oils of 100 and 300 seconds viscosity, crude and technical beta-naphthol, and the addition of aluminum stearate. With the exception of a single test of a band treated with 0.32 ounce of crude beta-naphthol in 300-viscosity oil, which gave unusually poor results, the following conclusions were reached in these experiments: A much higher percentage of kill than usual was obtained in all of the lower chemical loads; approximately 98 percent kill or better was obtained with chemical loads of 0.30, 0.31, and 0.32 ounce per 100 linear feet of 2-inch band; comparable chemical loads of light and heavy oil are approximately equal in killing value; comparable chemical loads of hot-dipped and cold-dipped bands are approximately equal in killing value; comparable chemical loads of crude and technical beta-naphthol appear about equal in killing value; the addition of aluminum stearate in these tests gave no significant advantage. In another series of experiments to determine the proportion of mature codling moth larvae captured in bands, five Jonathan and five Delicious apple trees were scraped thoroughly and banded with chemically treated bands in June 1935. All debris, such as is ordinarily found in semicover-cropped orchards, was left undisturbed throughout the season. Examinations of thinnings, for emergence holes of larvae, were made. Dropped fruit and fruit on the trees were also examined at intervals throughout the season, and harvested fruit at the close of the season. At the time of these examinations the bands were also examined, removed, and replaced by new bands. At the close of the season it was found that of the larvae leaving the fruit about 81.7 percent had been captured in the bands and killed. These figures are somewhat higher than the average reported from similar experiments, and probably represent the maximum efficiency that can be expected from banding.

The use of small immature apples for breeding fruit moth larvae.--H. W. Allen and Earl Lott report that during the several years of breeding large stocks of larvae of the oriental fruit moth (Grapholitha molesta Busck) at Moorestown, N. J., for parasite propagation, apples have proved to be the most satisfactory food. However, the full-grown marketable fruit is not uniformly satisfactory, as it tends to decay rapidly and to overwhelm the partly grown larvae in a mass of watery pulp. This is particularly true of apples wintered in cold storage and used early in spring, and for early fall apples used at a season when temperatures are too cool for maximum larval development, but not cold enough to retard decay. For several years the laboratory has been using small immature apples in host breeding work and such fruit is now being used, almost to the exclusion of mature marketable apples, at all seasons of the year. During the summer months, larvae grow very rapidly in this medium, and rot rarely reduces the production in any unit lot. The ratio of cocoons produced to the number of eggs used has been fully as high as in mass production at any season of the year. The immature apples being used are the fruit picked and discarded when apples are being thinned, and range from 3/4 inch to 1 1/2 inches in diameter. When considerable quantities are to be used and long storage is required, the apples are picked directly into bags, kept out of the hot sunlight, and chilled the day they are picked. If these precautions are observed, the fruit will keep well in storage. There has been some difficulty in storing this immature fruit over winter at Moorestown. This year, however, fruit picked and chilled, as indicated above, and wrapped in paper toweling, was carried through the winter in excellent condition, in commercial cold storage for apples (32° F. and 85 to 90 percent humidity). Approximately 100 percent of those not wrapped, and 50 percent of those wrapped in waxed paper, rotted in storage. Before the apples are used they are washed in a 1-percent hydrochloric acid solution to remove any excess arsenical residue, which is usually heavy on these small apples.

Flight of Blapstinus rufipes Casey.--Dwight F. Barnes and Charles K. Fisher, of the dried-fruit insect laboratory at Fresno, Calif., observed this species in flight in considerable numbers on the afternoon of March 19. The air temperature was 75° F. At the same time the species was plentiful on the ground, crossing a road from a recently plowed fig orchard toward a field of barley. The beetles in the air were moving in the same direction, at elevations of from 4 to 25 feet. No previous observation of the flight of these small darkling beetles had been made, and attempts by Heber C. Donohoe to induce flight in the laboratory had been unsuccessful. B. rufipes adults occasionally cause loss by feeding on figs on the ground. In 1935 this infestation was heavier than usual.

Milky disease of Japanese beetle larvae in the field and its soil-temperature relationships.--S. R. Dutky, Moorestown, N. J., reports that the spring build-up in the type A milky disease was observed starting on May 18. From the soil thermograph records at the Moorestown laboratory, 331 hours of temperatures of 60° F. or higher at the 1-inch level occurred up to this date. The average of these temperatures was 64.7°. The time required for the development of gross symptoms of type A milky disease at this temperature as calculated from the time-temperature relationship found experimentally with grubs inoculated by direct injection is 322 hours. Last year 311 hours of temperatures 60° or higher were required for the appearance of the disease with an average temperature of 65°. The average temperatures referred to were obtained by taking the arithmetic mean of mean hourly temperatures 60° or higher.

Colonization of imported parasite of Japanese beetle.--T. R. Gardner, M. H. Brunson, and L. B. Parker, Moorestown, report that during the period from May 12 through May 27 a total of 157 colonies of Tiphia vernalis Roh. were liberated in the Japanese beetle-infested area in the States of New Jersey, Pennsylvania, Delaware, Maryland, Connecticut, New Hampshire, and Rhode Island. These colonies, each consisting of 100 females collected in the field, were liberated in pastures, golf courses, estates, lawns, and other places where previous sample diggings showed grub populations sufficiently dense to warrant liberation. The colonization in New Jersey, Pennsylvania, northern Delaware, and northern Maryland covered the periphery of recent beetle infestation from above New Brunswick, N. J., to below

Wilmington, Del. Colonizations in central Delaware, central Maryland, Connecticut, New Hampshire, and Rhode Island were made at points where isolated infestations of the beetle have become sufficiently large to warrant liberation of this parasite.

MEXICAN FRUIT FLY CONTROL

Fruit fly data from the lower Rio Grande Valley.--Although more than 33,000 trap inspections were made by inspectors of this project during May, only one adult Anastrepha ludens Loew was taken in Texas. Seven adults were trapped in the border cities of Mexico within the same period. As there is no fruit on the American side of the border suitable for oviposition, no fruit fly larvae were found. Mangoes being received at the Mexican markets in Matamoros and Reynosa were found to be infested and considerable fruit was confiscated by the Mexican authorities. Present indications are that this area will produce the largest crop of citrus in the history of the valley.

DATE SCALE CONTROL

Eradication now complete.--Fan-palm inspection was completed in the Coachella Valley during the month and the inspectors were transferred to other projects. This completes the eradication project in the Coachella Valley. In the Imperial Valley clean-up work was completed and spot inspection continued.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Hessian fly status in Kansas and Missouri.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that dissection of plants collected on May 4 from eight fields known to be severely infested last fall has shown light infestations resulting from the principal emergence of hessian flies of the first spring brood in southeastern Kansas and southwestern Missouri. This light infestation was probably the result of dry weather during the emergence of the first part of the spring brood. Low humidity retarded oviposition, desiccated eggs, and interfered with larval migration. Stem infestation averaged 9 percent, with a range of from 0 to 58 percent. The average intensity was 4.7 forms per infested stem. Of these forms 91 percent were young larvae, principally of the first and second instars. Indications are that there will be no general second spring generation of hessian fly in southeastern Kansas and southwestern Missouri this year.

Grasshopper outbreak in California.--C. C. Wilson, of the Sacramento, Calif., laboratory, reports that a general outbreak of Melanoplus devastator Scudd., Oedaleonotus enigma Scudd., Hippiscus californicus Scudd., and Camnula pellucida Scudd. has been reported in the dry-land and foothill areas in San Joaquin, Sacramento, Placer, Butte, and Tehama Counties. Inspection of Sacramento County on May 29 indicated 100 square miles infested. The grasshopper populations ranged from 1 to 225 per square yard. General damage to shade trees and to garden and truck crops was noted. The stages represented ranged from second instar to adult, the fourth and fifth instars predominating, which would indicate that more serious injury to cultivated crops may be expected.

Flight of June beetles in southern Wisconsin.--T. R. Chamberlin and Lee Seaton, of the Madison, Wis., laboratory, report that the first flight of June beetles was observed in Wisconsin by members of the Madison laboratory staff on May 6 at Gays Mills, although some beetles were taken from beneath leaves early in April. With the exception of Phyllophaga tristis Fab., beetles have been scarce. P. tristis has been found in great numbers at Lamont, Waunakee, and Edgerton and was more or less abundant elsewhere. Oaks stripped or partially stripped have been observed in various localities in Dane and Lafayette Counties. Damage to oaks has also been reported from Dane and Waushara Counties and to raspberries in LaCrosse County.

Corn ear worm adults appear early in Kansas.--R. T. Cotton, Manhattan, Kans., reports that the first adults of the corn ear worm were taken in the Manhattan and Garden City light traps on April 27. In comparison with the 1935 record, this date was 3 weeks earlier for Manhattan and 4 weeks earlier for Garden City. The total number of adults taken up to June 6, 1936, was five times as great as during the same period in 1935.

Parasitization and disease in cutworms.--Mr. Cotton also states that several lots of cutworm larvae, collected from various localities in Kansas and Nebraska, have been reared to determine the extent of parasitization and disease. The recent outbreak of the pale western cutworm, which caused the most extensive damage on record in Kansas, afforded an excellent opportunity to observe the effect of parasites on this species. The following table presents the comparative data on parasitization and disease in cutworms for 1935-36.

Species	1936		1935	
	Parasitized	Diseased	Parasitized	Diseased
	Percent	Percent	Percent	Percent
Army cutworm (Euxoa auxiliaris Grote)	20	20	14	56
Pale western cutworm (Agrotis orthogonia Morr.)	9	32	(1)	(1)
Dingy cutworm (Feltia ducens Walk.)	4	5	3	10
Euxoa sp.	6	4	(1)	(1)

[1] No record.

Broad-horned flour beetle spreading.--Geo. B. Wagner, Manhattan, reports that the broad-horned flour beetle (Gnathocerus cornutus Fab.) was taken in Minneapolis, Minn., in one of the large mills the latter part of May. The adult beetles were estimated to comprise from 1 to 3 percent of the total insect population of the milling streams. This estimation was based on insects collected from milling stock cleaned from the elevator boots prior to fumigation. The occurrence of this species in the northwestern milling area is comparatively rare. This observation and a record of its occurrence in Kansas City, Mo., in 1934 seem to indicate a spread of this insect through the interchange of flour between milling units in different sections of the United States.

New piping system gains favor with milling industry.--Mr. Wagner says that the system recently developed for piping liquid hydrocyanic acid gas directly into the milling machinery through a system of copper tubing and pressure nozzles will be installed in 15 milling units this year. This makes a total of 25 milling companies that have adopted and are finding this new method satisfactory. Mills using this system have eliminated the costly clean-up preceding fumigation and the costly assembling of the milling machinery after fumigation. These milling units are now able to have two fumigations each year for approximately the cost of one fumigation by the old method of introducing the gas into the open space.

JAPANESE BEETLE CONTROL

Scouting-trap supply reaches 100,000.--Manufacture of 84,000 green-and-white Japanese beetle scouting traps was begun at the New Cumberland, Pa., warehouse on May 23. Power presses and other machines were run 24 hours per day. Use of galvanized supporting rods will eliminate the necessity for annual painting, as was required with iron rods. With the addition of the newly manufactured traps, the division's supply will number 100,000. The first model of the new-type trap was built in the fall of 1934. Since that time a joint patent covering certain new construction features has been issued to Donald Armstrong, of the New Cumberland station, originator of the collapsible features of the scouting trap, and F. W. Metzger, of the Japanese beetle laboratory, who patented the unique features of the original standard trap developed at the laboratory. Special jigs were developed to produce the trap economically on a 20-ton power press. One experienced man can manufacture approximately 475 complete traps per 8-hour day. The principal improvements in the new-type trap are lightness in weight, collapsibility, and cheapness of manufacture. The customary set-up for a typical community is 400 traps. Such a shipment of standard traps weighs 4,000 pounds and occupies 207 cubic feet. A similar set-up of scouting traps weighs only 826 pounds and can be packed in 8-1/3 cubic feet of space. The space required for 400 standard traps will accommodate 9,920 scouting traps. The scouting trap, which is slightly smaller than the standard trap, is packed knocked-down, minus rods, in two boxes. One box contains the cones, baffles, and "S" hooks. The second box contains the beetle containers and bait-dispensing blocks. This year's scouting traps will be manufactured from coated black plate in the recommended green-and-white color combination. The paint on the plate purchased is resistant to the action of the geraniol-eugenol bait. The total cost per trap assembly, including bait and bait dispenser, is approximately 18 cents.

Cooperative nematode experiments for Japanese beetle control.--Under a tentative agreement with the New Jersey Department of Agriculture, the Bureau will cooperate with the State laboratory at the Japanese beetle quarantine headquarters of the White Horse district in experiments to determine the effectiveness of the nematode Neoaplactana glaseri in eradicating established infestations of the Japanese beetle. Plans are being made for experimental work on the use of nematodes in connection with the treatment of potted plants to free the soil of larval infestation and render the plants eligible for certification. A few preliminary experiments indicate possibilities of such a treatment being successfully developed.

Soil Conservation nurseries add to inspection.--Establishment of several nurseries of the Soil Conservation Service in the central Pennsylvania territory has added considerably to the inspection work. So far this season, 700,000 black locust trees, 50,000 honeysuckle, and 100,000 coral berry bushes have been inspected and certified for shipment to New York and West Virginia. Several other nurseries of the Soil Conservation Service are being started and will be scouted this summer with a view to establishing their freedom from Japanese beetle infestation and their assignment to a preferred status.

High waters uncover corn borer infested stalks.--High waters in the Saco River in the town of Fryeburg, Maine, washed out a great many cornstalks that were plowed under last fall. European corn borer infestation is quite heavy in this section, therefore the exposure of large quantities of infested stalks is quite a serious problem to the farmers who market their corn at canning factories. Ears noticeably injured by corn borers are refused by the canners.

Corn borer scouting report available.--Distribution to State plant quarantine officials has been made of a report detailing the results of the scouting performed with W. P. A. labor during 1935 to determine the extent of spread of the European corn borer. Any interested official may obtain a copy of this report by addressing the field headquarters at Bloomfield, N. J.

Gypsy moth road stations discontinued.--Operation of gypsy moth vehicular inspection stations on the boundary of the generally infested area was discontinued on May 15 due to exhaustion of W. P. A. funds allotted for this work. From April 1 to May 15, inspectors at the road stations intercepted 94 shipments en route in violation of the satin moth quarantine and 16 shipments in transit contrary to the blister rust quarantine. Many of the white pines intercepted were badly infected with the blister rust. Inspection of a load of cordwood intercepted while en route from Wolfeboro, N. H., to New York City disclosed 20 gypsy moth egg clusters.

Schools inaugurated to train Dutch elm disease scouts.--With W. P. A. funds allotted to Dutch elm disease eradication work rapidly approaching exhaustion, the force of relief workers was drastically reduced on May 1. Relief workers with previous scouting experience and those whose work during the winter sanitation campaign indicated their adaptability to scouting work were retained and given opportunities to qualify as scouts. Most of the other relief workers were dismissed. Scout schools were inaugurated on May 16.

The initial enrollment in five New Jersey schools was 112 men. By May 23 the enrollment had increased to 260 men. In New Jersey it was necessary to release 79 W. P. A. workers who were unsuited for summer scouting. All New York W. P. A. workers were laid off on May 16, and the men who had proved their adaptability to scout work were told to report at scout school on May 19. A scout school in Rockland County, N. Y., started on May 25. Most of the men who trained in Rockland County were already experienced in this phase of the work. Approximately three-fourths of the men in training at White Plains had some experience in scouting for the disease.

Distant scouting for Dutch elm disease started.--Scouting was started during the week ending May 16 in all the outlying areas except Boston. Work will be performed at Baltimore and Brunswick, Md.; Philadelphia and the Delaware River area in Pennsylvania; Norfolk and Portsmouth, Va.; Knoxville, Tenn.; New Orleans, La.; Louisville, Ky.; Cincinnati, Dayton, Piqua, and Cleveland, Ohio; Indianapolis, Ind.; Chicago, Ill.; and Kansas City, Mo. The Boston work will start about June 1.

Cooperative experimental work.--Surveying and tree tagging are now progressing rapidly in New Jersey in cooperation with the Morristown laboratory. The experimental plot in Montclair was completed, with 429 elms tagged in this plot. Another plot at Maplewood was also completed. One New Jersey crew, working under the supervision of the laboratory, took trunk samples of all elms on the East Orange Water Reserve.

Elm wilting observed late in May.--Foliage wilting and wood discoloration apparently characteristic of Dutch elm disease infection were found on May 22 in connection with clear-cutting operations in Ashbrook Swamp in the New Jersey infected zone. Laboratory diagnosis of the tree was not received during the month. General wilting of elms was first observed during the week of May 23.

FOREST INSECT INVESTIGATIONS

Winter kill complicates beetle scouting.--During a reconnaissance survey of the recently acquired Laramie Peak addition to the Medicine Bow National Forest in Wyoming to determine the need for insect control work, J. A. Beal, of the Fort Collins, Colo., laboratory, noted extensive damage to ponderosa pine by winter-killing. This damage resulted from rapidly changing temperatures in March. Changes as great as 50° F. were reported as occurring in 5 minutes' time. It is not known what percentage of the injured trees will recover, but it is believed that many of them will die. No insect attack has yet occurred on them, but they have been so weakened that even secondary insects may kill them.

A tent caterpillar damages pine in southern Colorado.--Mr. Beal found a tent caterpillar, tentatively determined as Euschausia argentata (Pack.), doing considerable damage to young ponderosa pine on the San Juan and San Isabel National Forests, in southern Colorado. The tops of infested trees were badly defoliated by May 1 and the larvae have continued to feed throughout the month. It appears that pupation occurs early in June. The larvae collected and placed in rearing were so heavily parasitized by a braconid, Meteorus acronyctae Mues., that very few reached maturity.

Residents of Wallace, Idaho, take steps to protect their shade trees.--At the request of a city official, W. D. Bedard, of the Coeur d'Alene, Idaho, laboratory, examined the shade trees of Wallace for evidence of insect injury. All weeping birch trees were found to be heavily infested with aphids, and a nicotine sulphate and miscible oil spray was recommended. It was also found that the elm trees were infested with the European elm scale (Gossyparia spuria Mod.).

Winter mortality obviates necessity for bark-beetle control.--J. C. Evenden, Coeur d'Alene, reports that, as a result of abnormally low temperatures, the mortality to overwintering broods of the mountain pine beetle in the white pine stands of Twelve Mile Creek, Cabinet National Forest, Mont., was so great during the past winter that contemplated control measures were considered inadvisable. An examination of the area early in May 1936 revealed nearly complete mortality of the overwintering bark-beetle broods in more than half of the infested trees, and in the remaining trees between 80 and 90 percent of the broods were parasitized. Under these circumstances more parasites than bark beetles would be destroyed during control operations.

Control of mountain pine beetle in lodgepole pine.--Mr. Evenden also reports that control measures conducted on the Minidoka National Forest, Idaho, against the mountain pine beetle in the lodgepole pine stands will be completed soon after June 1. Work on this forest is being performed by C. C. C. laborers, E. R. A. employees, and crews hired on regular appropriations. Control work on the Wyoming National Forest, Wyoming, against this beetle in lodgepole pine will be completed early in June. An examination of infested areas on the Cache National Forest, Utah, reveals such a light infestation following 3 years of control that no further treatment was considered necessary at this time.

Parasite liberation.--Messrs. Dowden and Berry liberated a colony of Tetrastichus turionum Htg. in a red-pine plantation at North Greenwich, Conn., where there is a moderate infestation of the European pine shoot moth. They also liberated colonies of Ephialtes examinator Fab. at Syosset, N. Y., and Newtown, Conn., for control of the same insect.

Frost injury aids in gypsy moth control.--W. L. Baker, of the New Haven laboratory, reports that extensive frost damage occurred on May 16, 21, and 22 at Freetown, Mass., where he has been taking climatological records in connection with the gypsy moth ecological project. The scarlet, black, white, and scrub oaks were severely injured. In one area, where a high percentage of scrub oak foliage suffered frost injury, it is probable that the gypsy moth infestation will be greatly reduced, owing to starvation of the larvae. This frost damage may be of real significance, particularly in scrub oak and sprout growth of white, black, and scarlet oaks, as such growth has seldom, if ever, been known to harbor heavy gypsy moth infestations. The reason for this phenomenon may lie in their susceptibility to frost injury. Although they may produce new foliage, the absence of the normal supply of foliage for several days when the gypsy moth is in early larval instars undoubtedly results in practically complete extermination of the insect where it is limited to such foliage for food.

Cankerworm control.--C. W. Collins reports that he and other members of the Morristown, N. J., laboratory have assisted the National Park Service of the United States Department of the Interior in tests they have been conducting at the Morristown National Historical Park for the control of cankerworms. In these tests arsenate of lead has been applied as dust and as a spray by means of an autogiro. This was done in plots of deciduous woodland growth where cankerworms have been abundant during the past few years.

Life cycle of elm borer.--C. H. Hoffmann, Morristown, reports that the elm borer (Saperda tridentata Oliv.) can complete its life cycle in 1 year under certain conditions. Oviposition was obtained in elm logs during June and July 1935. These logs were kept out of doors in cages. The first adult Saperda emerged on May 23, 1936, and others emerged during the month. Mr. Hoffman states, however, that the borer may require 2 and perhaps even 3 years to complete its life cycle under other conditions.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Work under gypsy moth projects.--Up to May 16, under the W. P. A. projects, the numbers of workers employed under the gypsy moth projects in the different States were as follows: Maine, 274; New Hampshire, 282; Vermont, 986; Massachusetts, 925; Rhode Island, 96; Connecticut, 796; New York, 241; New Jersey, 159; Pennsylvania, 1,295; total, 5,054. From July 1, 1935, to the time of gypsy moth egg hatching this spring, men from C. C. C. camps have creosoted over 4,000,000 egg clusters. This number would have been materially greater, but for the flood and the loss of many men for several weeks during the critical period this spring before egg hatching. In several locations in Vermont considerable injury to maple, ash, and butternut resulted from low temperatures (as low as 20° F.) the middle of May. At Dorset, Vt., on May 14 a gypsy moth crew found the mountain tops covered with snow. On many trees from 20 to 100 percent of the foliage was severely injured, the heaviest damage appearing on ash and butternut. In several instances small gypsy moth larvae that had not left the egg clusters were dead. Many tent caterpillars noted on hilltops and open country at Washington, Vt., were killed by the severe frost on May 17. A large number of newly hatched gypsy moth larvae at Charlestown, N. H., had been killed. Gypsy moth supervisors in Pennsylvania reported heavy frost damage to all varieties of oak, maple, ash, beech, hickory, and several other kinds of trees. This condition was noted in Lehigh, Penn Forest, and Kidder Townships, in Carbon County, and in Foster and Dennison Townships, in Luzerne County. The partly grown new foliage was dry and crisp as though fire had gone through it. Much frost injury was noted in Berkshire County, Mass.

The brown-tail moth situation.--On May 16, under the W. P. A. emergency project, the numbers employed on brown-tail moth work, were as follows: Maine, 314; New Hampshire, 33; Vermont, 6; Massachusetts, 33; total, 386. In the final check-up of webs found on the islands of Portland, Maine, 308,954 brown-tail moth webs were recorded as cut on the eight islands. In 1935 many people were forced to leave Peak Island because of the enormous number of caterpillars that congregated on the sides of the houses, hotels, and other buildings. Large oaks, elms, apples, and other trees were completely defoliated by the caterpillars early in summer, and people walking or sitting under the trees were annoyed by the caterpillars dropping onto them. The bodies of the brown-tail moth larvae are provided with barbed hairs that cause intense irritation to the human skin. These hairs are hollow and contain a poisonous substance which acts on the blood corpuscles, causing serious poisoning, severe irritation, and external swelling. Many people on the island suffered more or less from this condition during the summer of 1935 and children were kept indoors in order to protect them from possible poisoning. The infestation this year was much heavier than in 1935 and, had not these webs been cut and destroyed, the conditions on Peak Island would have been unbearable. On the other seven islands the infestations ranged from light to medium, depending principally on the amount of favorable food present. On Long Island, which is well populated during the summer, the infestation was heavy.

PLANT DISEASE CONTROL

Barberry eradication.--On June 6 there were 4,128 men employed in connection with the stem-rust control program. Of this number, 3,941 were security-wage earners and the remainder were under appointment with the Bureau as supervisors. Crews of laborers are now working in about 200 counties and it is expected that the present employment level will be maintained until the end of June. On June 11 E. C. Stakman, in charge of rust surveys for the Division, submitted the following report relating to the stem-rust situation in the Mississippi River Valley: "At present it appears that there cannot possibly be a repetition of last year's epidemic of stem rust on winter wheat. In Texas and Oklahoma most of the wheat is ripe or cut and the aggregate damage from rust is negligible, although in Texas some late fields and low spots in other fields were heavily rusted. In southeastern Kansas wheat development ranges from the flower stage to almost ripe and in most fields there is only a trace of rust, but in some late fields, particularly in soft red wheats, infection is fairly heavy. These fields may produce enough rust to serve as sources of infection for fields farther north. Throughout most of Missouri, northern Kansas, and southern Nebraska there are only traces of stem rust, with most of the wheat in the dough stage. Unless weather becomes extremely favorable for rust development, it does not seem likely there will be heavy general damage, although late fields could be damaged considerably. No rust has yet been found on winter wheat in Illinois, Indiana, Ohio, or Michigan. In the spring-wheat region, rust has been found in southeastern South Dakota but not elsewhere. Barberries are very heavily infected and from June 5 to 8 weather was favorable for rust spread. It is entirely too early to predict the probable development of rust in the spring-wheat region in general." Vern O. Taylor reports that security-wage earners are now employed in 25 counties in Wisconsin. Eradication activities will have been completed in at least 6 of these by the end of June. Mr. Taylor reports that barberry infestations have been encountered in all counties where laborers are now working. In several instances, where the original survey was completed prior to 1928, survey crews are destroying second-growth bushes which have developed from seed that was in the ground when the initial work was done.

White pine planting.--A large acreage of white pine is to be planted this season on the Manistee National Forest in Michigan. A technician from the Milwaukee blister rust control office spent the month of April on the forest with the six E. C. W. helpers in selecting and mapping 15,000 acres of relatively Ribes-free areas suitable for the planting and growing of white pine.

Blister rust notes.--J. E. Riley, State leader in blister rust control work in Connecticut, reports that the uredinial stage of blister rust was found on escaped red currants on May 26. This was the first report of uredinia received for this season from New England. Dr. Honey, of Wisconsin, also reports the finding of uredinia on May 26 on Ribes cynosbati in Portage County, Wis. He states that at that time infection was quite general in the county on the wild prickly gooseberry in the vicinity of infected pine, some bushes showing heavy infection. Many of the uredinia had broken and were disseminating their spores, indicating that uredinia had been developed and could be seen for some days prior to this date. Aecia on pine were known to have been disseminating spores for at least 3 weeks prior to this date and many were still disseminating spores.

Progress in blister rust control.--The field season for blister rust control got off to a good start this spring in the 27 cooperating States where work is now under way. Up to June 6, there were 1,735 persons employed on this work in the sugar-pine region of California and Oregon, 4,151 in the Northeastern region, 352 in the Southern Appalachian region, 1,540 in the North Central region, and 4,716 in the western white pine region of the Pacific Northwest. The latter figure includes a small number of men employed in the white pine forests of Colorado and Wyoming. This shows a total employment of 12,494 persons on this work, of which 6,043 are in the Eastern States and 6,451 in the Western States. Of this total, 11,912 are security-wage workers, the remainder being appointed personnel used as supervisors. Additional security-wage workers will be taken on during June until the quota scheduled for this project has been filled. At present over two-thirds of the quota has been obtained.

COTTON INSECT INVESTIGATIONS

Toxicity tests for boll weevil and leaf worms.--The cage toxicity tests for boll weevil and leaf worms conducted last season at Tallulah, La., have been reported on by G. L. Smith, J. C. Clark, and A. L. Scales. Screen cages 4 by 4 by 4 feet were placed over cotton plants on which the insects were introduced in the afternoon and then dusted the following morning. The tests were replicated at different times during the season and the natural mortality varied considerably. Untreated plants and plants dusted with calcium arsenate were used as checks with each series. Calcium arsenate mixed with sulphur 1 to 1, 1 to 3, and 1 to 9 (parts by weight) killed 60, 48, and 48 percent, respectively, of the weevils, as compared to 73 percent killed with calcium arsenate. Used against the leaf worms these mixtures were more effective and more uniform, each killing approximately 86 percent of the worms, as compared to 97 percent killed with calcium arsenate. Lime and kaolin mixed with calcium arsenate in the same proportions as the sulphur were less effective against both species than were the sulphur mixtures. Their toxicity also decreased more rapidly as the arsenical content was lowered. The toxicity of the six special calcium arsenates prepared under the direction of the Division of Insecticides ranged from 36 to 63 percent and all were less effective against the boll weevil than was the commercial calcium arsenate with 72-percent kill. The addition of 25 percent kaolin slightly improved the kill with some of the special calcium arsenates. For the leaf worm all the special calcium arsenates were more effective, ranging from 86 to 97 percent mortality, as compared to 93 percent for the commercial calcium arsenates. The kill of leaf worms with the special calcium arsenates was, with one exception, slightly decreased by adding 25 percent kaolin. Paris green killed 78 percent of the boll weevils, as compared to 67 percent killed with calcium arsenate. When mixed 1 to 3 and 1 to 9 with calcium arsenate the kill was not decreased, but was decreased when mixed in the same proportions with sulphur, and much more reduced with kaolin. For the leaf worms, paris green, calcium arsenate, and 1-to-3, or 1-to-9 mixtures of these two, were all about equally effective with more than 95-percent kill. The kill of leaf worms obtained with the mixtures of paris green, sulphur, and kaolin was lower than with the straight paris green but was not lowered as much as when used against the boll weevil. Derris root containing 4 percent rotenone killed 69 percent of the boll weevils, as compared to 60 percent with calcium arsenate, but when diluted with sulphur or kaolin to 2 percent, 1 percent, or 0.4 percent rotenone content, the kill was greatly reduced and was not comparable to calcium arsenate. The mortality of leaf worms with derris containing from 0.4 percent to 4.0 percent rotenone was much lower than with calcium arsenate in all tests. Phenothiazine, undiluted or diluted with sulphur or kaolin gave very poor results against both the weevil and leaf worm, killing from 8 to 53 percent. The results were better when this material was mixed with sulphur than when mixed with kaolin, and mixtures up to 1-to-9 with sulphur were almost as effective as the straight phenothiazine. Pyrethrum (0.5 percent total pyrethrins and "activator"), used alone or mixed with sulphur or kaolin, gave a very low kill of boll weevils. For the leaf worms, the kill with pyrethrum containing 0.5 percent pyrethrins was almost equal to the calcium arsenate, but pyrethrum was not so effective when mixed with sulphur or kaolin, although the sulphur mixtures were better than kaolin mixtures.

Boll weevil emergence and abundance.--Weevils were removed from the hibernation cages beginning on May 11 this year. This date was selected because cotton was up to a stand in the fields and the weevils were able to find terminal buds for feeding. At Florence, S. C., F. F. Bondy recorded only 2 weevils emerging from hibernation cages in May, as compared to 152 weevils in 1935, 9 in 1934, and 2,300 in 1933 from comparable cages. The winter of 1935-36 was exceptionally cold, with a minimum of 2° F. on February 1. The month of May was very dry, having only 0.17 inch of rainfall. The first weevil was found in the field on May 11. During the last week in May, 13 weevils per acre were found in the fields examined. During the same period, 115 weevils per acre were found in 1935, and 14 per acre in 1934.

The stand of cotton is generally very poor and in some fields seed has not germinated because of lack of moisture. This condition has tended to concentrate the weevils in the better fields, where examinations were made. The present indications are that it will take a rainy season to cause much early weevil damage. At State College and Hattiesburg, Miss., H. C. Young and L. L. Williams also report that weevils are less abundant than last year. In Oktibbeha County weevils were found on only 5 of the 28 farms examined during the week ending June 6. An average of 1.6 weevils per acre were found, as compared to 29 weevils per acre in 1935. In Forest County 10 fields were examined, yielding an average of 17 weevils per acre, as compared to 94 per acre in 1935 and 212 per acre in 1934. At Tallulah, La., R. C. Gaines and associates reported that a total of 52 weevils had emerged from cages to June 6, as compared to 36 in 1935, and 2,395 in 1934 from comparable cages. Weevils were also scarce in the fields, only 9 per acre being found, as compared to 138 per acre in 1935 and 309 per acre in 1934. Two weevils were caught on the flight screens during the week ending June 6, as compared to 23 in 1935 and 49 in 1934. At College Station, Tex., R. W. Moreland reports that 791 weevils had emerged from the hibernation cages to June 6, in comparison with 68 in 1935 and 1,033 in 1934 from comparable cages. There was a very heavy emergence during the last week of May with 332 weevils coming out of hibernation. In field examinations 20 weevils per acre were found in the river bottom fields and 795 per acre in the upland fields. Cotton is several weeks later than in 1935, when an average of 28 percent of the squares were found infested on upland cotton and 1 percent on bottom land during the first week of June. K. P. Ewing and associates report an average of 6 weevils per acre on cotton in the open prairie section of Calhoun County, Tex. In the adjoining counties, no weevils were found in the prairie section, and 122 per acre in the river-bottom fields of Victoria County and 375 per acre in the river-bottom lands of Jackson County. At Eufaula, Okla., C. F. Stiles reports that no weevils had emerged from the hibernation cages up to June 2. Last year 20 weevils had emerged and in 1934, from comparable cages 185 weevils had emerged by this date. It is still very dry, which may be one reason why weevils are not emerging.

Hemipterous insects of cotton in 1935.--Reports on the damage caused and results of tests conducted at Buckeye, Ariz., last season with insecticides for controlling hemipterous insects of cotton have been received from T. P. Cassidy and T. C. Barber. Included in this group attacking cotton are Euschistus impictiventris Stahl, Chlorochroa sayi Stahl, C. ligata Say, Thyanta custator Fab., Dysdercus mimulus Hussey, Lygus hesperus Knight, Psallus seriatus Reut., Parthenicus sp., and several other species. All of these insects have other cultivated and wild hosts from which they migrate to cotton when these plants become unsuitable for food. More than normal winter rainfall caused a heavy spring growth of desert vegetation favorable for breeding. With the drying up of these plants, the harvest of the winter grain crops, and the withholding of irrigation water from alfalfa, there was a general concentration on the cotton. Apparently the pentatomids are not able to breed on cotton until after fruiting begins, and some of the mirids have difficulty in maintaining themselves on cotton. Of the five species isolated in field cages to study the extent and nature of their damage, Euschistus impictiventris caused the most serious damage. The number of bolls set was greatly reduced and those present were so badly punctured that the lint was almost completely destroyed. Lygus hesperus caused the shedding of many squares and also caused growth abnormality of the plants. The destruction of the small leaf buds and minute squares by Lygus produces plants with many vegetative branches, short, thick internodes, and distorted and swollen nodes. C. sayi, T. custator, and D. mimulus all caused a serious reduction in the number of bolls produced and staining and discoloration of the lint in the bolls produced. The field damage caused by the different species does not necessarily rank them in this order because of the variation in their relative abundance throughout the season. It is also difficult to differentiate between the damage caused by the different species within the two groups of insects. The damage caused by the square-feeding mirids is partly compensated for by the production of other squares, whereas the damage by the pentatomids is largely to bolls, which are not replaced. A survey was conducted near the end of the season to estimate the damage in the important cotton sections of Arizona. Samples of bolls from representative fields were examined for proliferation and punctures; therefore the results did not include the damage to the squares. Considerable variation was found in different districts, averages ranging from 43 percent of the bolls punctured in Yuma County to 7.7 percent in Pima County. In Maricopa, the most important cotton county, 41 percent of the bolls were punctured and the average for the entire State was 27 percent of the short-staple varieties, as compared to 23.4 percent in 1934. Bolls of short-staple varieties were more damaged than those of long-staple varieties. Considerable variation in damage among the short-staple varieties was noted in a variety test at the Bureau of Plant Industry's laboratory at Sacaton.

Control of hemiptera on cotton.--Eight insecticides or combinations of insecticides were tested in 1-acre field plats. Dusting was started on July 30 and continued at approximately 5-day intervals until nine applications had been made. A frost on October 30 killed the plants about 3 weeks earlier than usual and somewhat reduced the yields, as there were still many green bolls on the plants. The results were as follows:

Materials tested	Increase per acre in yield of seed cotton over check	Percentage of increase
	Pounds	
Lead arsenate	523	28.57
Sodium fluosilicate	-151	-8.27
Derris (0.6 percent rotenone)	131	8.26
Derris and sulphur (0.3 percent rotenone)	151	9.09
Paris green (1 part); sulphur (14 parts)	247	14.75
Sulphur	206	12.29
Pyrethrum (0.58 percent pyrethrins and "activator")	137	9.35
Pyrethrum (1 part) and sulphur (1 part)	41	2.80

Records were also made of forms, insect population, and punctured bolls in the plats during the season and these, in general, corresponded with the increases in yield. The gain from the lead arsenate plat was slightly less than in 1934, when it was also larger than from any other insecticide tested. Cage toxicity tests with *E. impictiventris*, *C. sayi*, *T. custator*, *D. mimulus*, and *L. hesperus* ranked the insecticides differently. Considering these four species collectively, the average mortality in the cage tests was: Derris, 62.8 percent; cube, 45.2 percent; derris and sulphur, 40.4 percent; sodium fluosilicate, 37.2 percent; phenothiazine, 28.2 percent; lead arsenate, 23.2 percent; and sulphur, 3.2 percent.

Pink bollworm in Puerto Rico.--L. C. Fife reports that, owing to delays in planting on account of drought conditions, cotton fields of all ages from young seedlings to those with open bolls are to be found among the 2,500 to 3,000 acres on the northern coast of Puerto Rico. The pink bollworm infestation is already rather high this early in the season and with the long season before harvest an unusually heavy infestation is expected. The only other plants in which the pink bollworm has been found are Maga (*Montezuma speciosissima*) and Clamor (*Thespesia populnea*) and only when these are growing within 2 to 3 miles of infested cotton. Of the larvae in infested bolls collected during January and left on the soil surface 65 percent remained in an inactive state for 41 days, 26 percent for 82 days, and 4 percent for 125 days, showing that the pink bollworms in open bolls form a long cycle or resting state and are able to survive in the absence of host material for more than 4 months. Live larvae were found in cocoons formed in the soil after 78 days, but none after 120 days. Fire ants, however, had destroyed most of the larvae in these cages.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Trap-plot cotton in the Big Bend.--Because of cold weather during April, the trap-plot cotton in the Big Bend area of Texas did not get a very good start. During May, however, conditions were more favorable, and the cotton made fairly satisfactory growth. The unfavorable weather also affected the field cotton and although the plot cotton is not as far advanced over the field cotton as we would like, in most cases there is still probably enough difference to produce the desired results. By the end of May the plot cotton was beginning to produce a few blooms, and during the first few days of June some of these were found to be infested. This year considerable stub cotton came up in the Big Bend area and it was considered advisable to destroy it. Very little such cotton was located in the upper end of the area, but in the Presidio district some 24,000 plants were grubbed out, as were 2,000 plants at Castolon, in Brewster County. This stub cotton had already begun putting on squares and while it was being destroyed some of the larger squares were examined and found to be infested. The destruction of this cotton before any worms reached the adult stage will undoubtedly aid in preventing the building up of infestation early in the season.

Wild cotton eradication.--The eradication of wild cotton in southern Florida has continued to make very good progress. Work was completed in a number of sections before the end of the month. In several sections along the west coast a second recleaning for this season has been done, and this should prevent any plants reaching the fruiting stage before work is resumed in the fall. Work will still be carried on in a few places during the first part of the coming month. During May a first clean-up was made on 836 acres, from which 6,842 mature and 6,193 seedling plants were destroyed. A recleaning was made on 8,657 acres, and 2,217 mature, 192,513 seedling, and 2,517 sprout plants were destroyed. Over 1,800 of the mature plants were destroyed on Cape Sable. Work is being carried on with W. P. A. funds and mature plants will be found in areas previously cleaned, as the larger crews now being used are able to cover the territory more thoroughly. The small number of mature plants found in areas recleaned several times indicates that considerable progress is being made toward eradicating the wild cotton. Bolls were collected throughout the month as the wild cotton was destroyed, and a number of pink bollworm specimens were found. Infestations were found at Sound Point off Key Largo, where infested bolls were collected last month, on Lignum Vitae Key, and on lower Matecumbe Key, all in Monroe County.

Thurberia plant eradication.--The eradication of Thurberia plants in the Santa Catalina Mountains of southern Arizona has gone forward satisfactorily without loss of time. A considerable number of plants were located and destroyed during the first half of the month in sections close to those in which a large number of plants were found the latter part of April. The latter half of May the crews worked along the southern edge of the mountains northeast of Tucson. As the area was not so rough as some sections previously worked and as fewer plants were encountered, the men were able to cover larger acreages each day. During the month, 11,960 acres were covered and 106,873 plants were destroyed. Many of the colonies of plants were infested with the Thurberia weevil, and it is to remove this menace to commercial cotton that the Thurberia plants are being destroyed. This work also is being carried on with W. P. A. funds.

Laboratory inspection.--The inspection of material collected from the 1935 cotton crop has gone forward as usual. These inspections are being carried on at San Antonio and a number of field stations. Now that the ginning season has been completed, there is less regulatory work to do; consequently the men at the field stations are able to devote more time to inspection. A considerable amount of material collected within and outside regulated areas was inspected during the month with negative results, other than the findings in the wild cotton bolls previously mentioned.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Effectiveness of sprays containing rotenone or pyrethrum against false chinch bug on sugar beet.--E. W. Davis, of the St. George, Utah, laboratory, reports that in recent insecticide tests directed against *Nysius ericae* Schill. as a pest of sugar beets grown for seed, promising results were obtained with sprays containing a low percentage of rotenone with a commercially prepared diphenyl butyl sodium sulphonate as a spreader and wetting agent. Slightly inferior results were obtained with sprays containing pyrethrum. Sprays containing nicotine sulphate had an immediately beneficial effect, but the plants treated with this material became reinfested within 4 or 5 days. Results of these preliminary tests indicate that under conditions existing in Utah, sprays containing rotenone or pyrethrum may be effective in controlling the false chinch bug as a pest of sugar beets grown for seed.

Insecticides containing rotenone vary in toxicity to cucumber beetle species.--As a result of preliminary cage and field tests performed by K. B. McKinney, of the Phoenix, Ariz., laboratory, it appears that rotenone-containing insecticides are more toxic to the striped cucumber beetle (*Diabrotica vittata* Fab.) and the banded cucumber beetle (*D. balteata* Lec.) than to the spotted cucumber beetle (*D. duodecimpunctata* Fab.). These results were obtained during the course of experiments wherein cantaloups, cucumbers, and watermelons infested by the three species of beetles were treated with a dust mixture of derris and cube containing 1 percent rotenone, with talc as a diluent. It was shown that, under conditions existing in the Salt River Valley of Arizona, talc alone had some repellent effect on the three species of beetles involved. In general, the application of this dust mixture kept small watermelon vines growing in the field free from beetles for at least 4 days.

Derris root sprays effective against bean leaf beetle.--L. W. Brannon, of the Norfolk, Va., laboratory, reports that in preliminary tests, derris sprays containing 0.015 percent rotenone were shown to be effective against *Cerotoma trifurcata* Forst., which has been abnormally abundant in the Norfolk section during May. The treatment applied to the infested snap beans was the same as that recommended for the control of the Mexican bean beetle. Before treatment of these snap beans, the foliage injury caused by the bean leaf beetle was estimated at from 60 to 75 percent. Eleven days after treatment the foliage injury on the treated plots was estimated at from 5 to 15 percent, whereas on the untreated plots it ranged from 35 to 40 percent.

Small spring brood of beet leafhoppers in southern Idaho.--According to a report from J. R. Douglass, of the Twin Falls, Idaho, laboratory, the movement of the beet leafhopper from the desert areas to the cultivated fields of southern Idaho began about May 25 and reached its peak on or about June 1. The spring brood of leafhoppers in this region is relatively small this season, as a result of the low populations of overwintering leafhoppers and a scarcity of favorable host plants in the desert areas upon which to reproduce early in the spring. Weather conditions in May were only slightly above normal; consequently the magnitude of the spring brood and the time of movement into the cultivated areas were in accordance with early season indications.

Lima bean pod borer adults attracted to monochromatic blue light.--Reporting on phototropic studies made in cooperation with the University of California at Berkeley, Cecil Rodney, of the Ventura, Calif., laboratory, says that in general the lima bean pod borer adults did not exhibit any differences in the phototropic reaction between the sexes or the ages of the adults, but that all of the adults were attracted in a similar manner to a monochromatic blue light in preference to the darker blue lights used in the tests and to various shades of yellow, green, red, and violet.

Effect of direct sunlight on toxicity of cube dust.--F. S. Chamberlin, of the Quincy, Fla., laboratory, reports that recent laboratory and field experiments designed to determine the loss in toxicity of cube dust as a result of exposure to direct sunlight have shown that the toxic properties of a cube dust mixture with denicotinized tobacco dust as a diluent have decreased rapidly when this dust mixture was subjected to direct sunlight, and measured by its toxicity to the tobacco flea beetle. These experiments also disclosed that the cube dust mixture containing 1.5 percent rotenone maintained its toxicity much longer than did a dust mixture containing 0.5 percent rotenone. A cube dust mixture containing 1 percent of rotenone killed 74 percent of the tobacco flea beetles after the dust mixture had been exposed to direct sunlight for 24 hours, which was equivalent to approximately 48 hours' exposure under field conditions. In performing these experiments it was not possible to make proper allowance for two important influences which ordinarily occur under normal shade-grown tobacco conditions, namely, the wetting effect of heavy dews and the dense shade which prevails within a crop of maturing shade-grown tobacco. Consequently, it is probable that under actual field conditions cube dust mixtures will retain their insecticidal efficiency against the tobacco flea beetle for a longer period than was indicated by these experiments.

Quantity of tobacco consumed by each cigarette beetle.--In connection with biological studies on the cigarette beetle, E. M. Livingstone, of the Richmond, Va., laboratory, reports that detailed laboratory experiments have shown that it requires an average of approximately 0.0151 gram of Turkish tobacco to feed each cigarette beetle throughout its life period and that the weight of the frass from each beetle averaged approximately 0.0118 gram. These experiments were conducted under temperature and humidity conditions which, previous experiments had shown, provided optimum conditions for the cigarette beetle.

INSECTS AFFECTING MAN AND ANIMALS

Percentage hatching of eggs of certain species of mosquitoes of Pacific Northwest.--H. H. Stage, of the Portland, Oreg., laboratory, working on the life history and habits of the more important species of mosquitoes of the Northwest, reports as follows: "In order to obtain a check of the percentage of eggs of *Aedes vexans* Meig. and *A. aldrichii* Dyar and Knab hatching with the normal flood of the Columbia and Willamette Rivers, a series of five samples were flooded each week under outdoor conditions, beginning on April 13. In the five samples flooded on that date, 6.2 percent of the *A. vexans* and 8 percent of the *A. aldrichii* hatched. In the series of samples flooded weekly from that time to the present the hatch has been completed for both species. Prior to April 13, samples produced no larvae, even though they were flooded in the laboratory. Our observations demonstrated that the eggs began to hatch in nature between April 2 and 13 and by April 21 all had developed to the point of hatching. The first larvae of the season were found in nature on April 21, when the river height was 9.7 feet. It seems probable, therefore, that nearly all of the eggs should have been hatched, as the crest of 19.4 feet was not reached until May 18."

Spread of primary screw worm fly.--Studies undertaken by D. C. Parman, C. C. Deonier, and W. L. Barrett, of the Uvalde, Tex., laboratory, show that Cochliomyia americana Cushing and Patton overwintered along the edges of the Edwards Plateau escarpment and from points along this line they have, up to June 9, spread as far north as Parker County, Tex.

Wild-animal hosts of C. americana.--A. W. Lindquist, of the Uvalde laboratory, working on wild animal hosts of the primary screw worm fly, has found that jack rabbits, cottontails, opossums, and deer were quite frequently infested with larvae of this species during May. The occurrence of screw worms in opossums is a new host record for this species, and it is indicated that this class of animals is very susceptible to screw worm attack. The males frequently fight with consequent injuries, and the females, especially when carrying the young in the pouch, offer attractive places for oviposition by C. americana. The infestations occurring in cottontail rabbits usually result from holes in the skin caused by emergence of bot flies.

Phenothiazine as a screw worm larvicide.--Preliminary experiments carried on by Roy Melvin, E. R. McGovran, L. O. Ellisor, and Raymond Bushland, at the Dallas, Tex., and Valdosta, Ga., laboratories, for the purpose of developing more effective larvicides against screw worms, indicate that phenothiazine may be of value for this purpose. This material, when applied to an infested wound, gave a very high kill and, in addition, young larvae hatched from eggs deposited after the application were prevented from becoming established.

Outdoor tests of the repellent action of various insecticides against Mansonia perturbans Walk.--Tests were made by W. V. King, G. H. Bradley, and T. E. McNeel, at the Orlando, Fla., laboratory, to determine the effectiveness of various insecticides when applied out of doors in keeping down the abundance of mosquitoes, M. perturbans, in a given area. The materials tested include pyrethrum extract emulsion, kerosene emulsion, pyrethrum dust and sulphur, pine-tar-oil emulsion, and nicotine dust. The materials were applied shortly before the dusk flight of the mosquitoes, and the effectiveness of the various insecticides was checked by determining the relative abundance of the mosquitoes caught in electric-light mosquito traps which were operated all night in each of the treated and untreated areas. The percentage reduction ranged from 0 for pine-oil emulsion and pyrethrum dust with sulphur to 90.8 percent for pyrethrum-extract emulsion.

FOREIGN PLANT QUARANTINES

Unusual apple infection from Japan.--An apple from Japan intercepted on April 22 at Philadelphia bore a number of unusual circular, light-colored spots with rather sharply delimited margins and a tiny dark dot in the center. Isolations from these spots by specialists in the Bureau of Plant Industry gave pure cultures in all instances of Cephalosporium parmelii var. purpurascens Buchanan. This fungus, described by R. E. Buchanan in 1911, was reported to be present in humus-rich soil in Iowa. This seems to be the first report of this fungus affecting apple although at least one other species of Cephalosporium is capable of producing a slow decay on apples and pears. On May 18 an apple from Japan bearing similar spots was intercepted at Portland, Oreg. It seems possible that a Japanese strain of the fungus has become a regular parasite of apple.

Tuckahoe potato reported in China.--A note in the January News Letter, page 22, stated that so far as known the Tuckahoe potato (Poria cocos (Schw.) Wolf) had not been reported from China. We find that two Chinese scientists have published an article in one of their journals indicating that the fungus is not only found there but is grown as a crop. In some places the sclerotia are grown by burying small pine poles in hill slopes leaving one end exposed for inoculation artificially with small flakes of sclerotium or by natural means. In other localities the fungus is twice subcultured on completely buried poles before the main crop is grown in the manner described above. Over 1,000 tons of the sclerotia are exported annually. It is imported at San Francisco in quantity. The Chinese call the sclerotia "fuhling" and use them medicinally. The Japanese "bukuxyo" may be the same fungus, according to the Chinese scientists.

Dirigible Hindenburg carried plant diseases.--Inspectors from Philadelphia made the following plant disease interceptions May 9 when they inspected the Hindenburg following its first arrival: Anguillulina dipsaci (Kuhn) Gerv. and v. Ben. in potato; Aspergillus sp. on rose stems; Botrytis cinerea Pers. on cabbage and tulips; Cladosporium sp. on carnations and roses; Diplocarpon rosae Wolf on rose leaves; Fusarium sp. on rose stems; Macrosporium sp. on leek leaves; Penicillium sp. on asparagus, cabbage, leeks, onions, roses, and tulips; Phomopsis citri Fawc. on lemons (from Italy); Rhizopus nigricans Ehr. on cabbage; Spondylocladium atrovirens C. O. Harz on potatoes.

Plant diseases at Chico.--Knowledge of plant diseases found on all plants growing in and near plant quarantine stations should be available to inspectors in order that they may properly evaluate their findings. In order to obtain such knowledge collections must be made over a period of years. An effort is being made to do this at the Chico, Calif., station. An analysis of the plant disease collections made at this station in the latter part of October 1935, shows 4 collections belonging to genera not reported to occur on the hosts concerned, 3 collections unlike the species reported on the host, another reported as "probably" a new species, and 10 collections determined to genus only and hence of doubtful status. In view of the large number of unusual hosts in the Chico collections and the range of native hosts and little-known diseases, this may seem to be a small number of new records; however, there are enough to justify the conclusion that intensive collecting should be continued.

More shamrocks at Baltimore.--An unusual number of mail shipments of shamrock entered at Baltimore this year, adding eight insects to their list for the host. These insects were Achorutes sp., Ceutorhynchus sp., Dorytomus sp., Leimacis ? dimidiata (Curt.), Megophthalmus scanius Fall., Mycetoporus sp., Tachyporus sp., and Tipula sp. The insects were alive when found. Thrips, mites, Alternaria sp., Bacteriaceae, and Fusarium sp. were found on the shamrock also.

Cottonseed on top of railway car returning from Mexico.--In connection with the inspection of freight cars returning from Mexico at Mexican border ports, it has been the opinion for a number of years that there was little likelihood of cottonseed being on the top of box cars; hence the inspection of these cars has been confined chiefly to the interior of the cars. On January 15, 1936, a car inspected in the railway yards at Juarez, Chihuahua, Mexico, resulted in the finding of approximately 10 pounds of cottonseed on the top of the car. The seed appeared to be old and there was evidence of previous insect infestation. No living insects were found, but close examination revealed the fragments of four dead larvae which were identified as the pink bollworm.

Cottonseed in alligator mouth.--A dozen cotton seeds were found in a wad of cotton in the mouth of a small stuffed alligator in the baggage of a passenger from Puerto Rico landing at New York, March 16.

"Bug Convention" in packing.--Over 90 "delegates" belonging to more than 30 genera or species were found to be using the packing around a single grape cutting as a "convention hall" when some baggage from Germany was inspected at New York on January 10. The packing consisted of ¼ pound of sphagnum moss mixed with a very small amount of forest litter.

DOMESTIC PLANT QUARANTINES

Transit-inspection activities.--During March and April, 445,394 shipments of nursery stock and other restricted articles were inspected at 22 stations, and 629 violations of the regulations of domestic plant quarantines were intercepted. Inspection records show that more shipments were inspected and more interceptions made during these months than at any similar period during recent years. The movement of nursery stock through St. Paul and Minneapolis was also heavier this spring than for several years past, and the retention of a full-time transit inspector in the Twin Cities has been fully justified. Of special interest was the interception at Omaha and Council Bluffs of 99 violations of the Japanese beetle quarantine in March, April, and May, as compared with 18 in the same period last year. This increase is due to the expansion of activities at this point.

Wisconsin establishes blister rust control areas.--The eradication of all European black currant plants from the State of Wisconsin, with no compensation allowed to owners, was ordered by the Wisconsin department of agriculture and markets in a notice dated May 5, 1936, declaring these plants to be carriers of the white pine blister rust.

Citrus canker inspection in Texas.--Recent inspections for citrus canker in Texas covered the counties of Matagorda, Jackson, Calhoun, and Victoria, an area in which canker was known to exist in former years. Other crews continued to reinspect properties in the Houston area. The decrease in the number of infections found in 1936, as compared with those in 1935, indicates progress in eradication.

Aerial survey of ground flora proves practicable.--An analysis of the recent experience in the use of an autogiro, loaned by the leader of the Dutch elm disease project, for a survey of citrus growth in the Louisiana marsh area has confirmed the belief that such a method of survey of this inaccessible area is entirely practicable and economical. It was found that the giro could be lowered to within 25 feet of the plants, slowed to 25 miles an hour, and circled in a small radius, making it easy to identify the plants without the use of binoculars. The entire Gulf coast from New Orleans to Orange, Tex., an area approximately 200 miles long and from 30 to 50 miles wide, was covered, representing an examination of approximately 500 square miles a day. The region is largely marshland, interspersed with many hundreds of timbered moats and other small dry-land areas, some of which have been used as camp sites by many generations of fishermen and trappers. It has been recognized that citrus, subject to canker infection, existed on some of these sites. The survey disclosed approximately 600 such trees on 24 locations. These places will be reached by mud boats poled over routes known only to trappers and fishermen and the trees will be inspected.

Phony peach disease inspection.--Under the expanded inspection program made possible by the Emergency Relief allotment, 123 inspectors are now engaged in inspecting peach plantings and peach nursery environs in 11 infected States. State inspectors in most of the States serve as leaders, devoting their entire time to the work, and in some instances practically the entire force of State nursery inspectors has been temporarily assigned to this work. To the close of May, 81 counties have been worked, representing inspection of over 6,000,000 trees on 16,847 properties. Over 17,000 infected trees have been located to date. In view of the more complete coverage, it is difficult at present to determine the relative prevalence of the disease as compared with previous years. Excellent cooperation has been received from State officials and from growers in obtaining the prompt removal of diseased trees. Eradication crews under the W. P. A. project have removed over 35,000,000 abandoned, escaped, and infected trees during the life of the project.

Peach mosaic disease situation.--The relief-work project relating to the inspection and eradication of the peach mosaic disease is continued in Mesa and Delta Counties, Colo., 9,295 infected trees in Mesa County and 12,320 abandoned peach trees in the area having been destroyed since the project was begun last August. An intensive tree-by-tree inspection of the diseased area, just completed, disclosed an 80-percent reduction in infection over that of a year ago. In addition to the mosaic infection in Mesa County, Colo., this disease is known to exist in widely scattered areas in Texas and in local areas in Utah and California. The cooperative survey now being conducted in Iowa, Nebraska, Kansas, and New Mexico has thus far resulted in finding no infections in these States.

BEE CULTURE

Honeyflow disappointing.--The early honeyflow in the vicinity of the National Agricultural Research Center, Beltsville, Md., has been disappointing this spring. Strong colonies stored some surplus, but weak colonies and those of average strength have thus far gathered only about enough for their daily needs.

Notes on foulbrood.--Additional experiments on the resistance of spores of Bacillus larvae White to heat have shown that they possess a remarkable degree of resistance to boiling in water. In recent tests growth was obtained in most of the cultures prepared with spores that had been boiled for 4 hours. Germination was delayed longer than with unheated spores, but the growth was fairly luxuriant. Negotiations are in progress with the Agricultural Experiment Stations of Wyoming, Iowa, Wisconsin, and Texas for cooperative investigations of the resistance of honeybees to American foulbrood. A. P. Sturtevant, in charge of the Intermountain Bee Culture Field Laboratory, Laramie, Wyo., is planning the details of this new project.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

A curculionid infesting the fruit of banana.--Three distinct lots of material intercepted by the Division of Foreign Plant Quarantines at Brownsville, Tex., and submitted for identification contained coleopterous larvae which have been identified by A. G. Boving as Metamasius sp. This form is of more than usual interest, as M. sericeus Oliv. and its variety carbonarius Chev., commonly found in banana debris, are known to bore in roots and stems but have not been found in the fruit. After a careful study of the available larval material of Metamasius, Mr. Boving has concluded that the larvae from banana fruit are distinct from M. sericeus, but that they cannot be distinguished from larvae of M. ritchiei Marsh. from Jamaica, which were found infesting pineapple. The species in this group are exceedingly close, however, and it is not presumed that the specimens from banana are in reality M. ritchiei.

Ceutorhynchus assimilis Paykull abundant in Washington.--This European weevil, recently recognized from North America, is reported as a serious pest of seeds of cabbage and turnips at Mt. Vernon, Wash., by A. J. Hason, who submitted more than two hundred adult specimens for determination. These were identified by L. L. Buchanan.

Larva of Phyllophaga vandinei received.--Among some Puerto Rican material received for identification from H. K. Plank were adults, larval and pupal skins, and one larva of a species of Phyllophaga which has been identified by E. A. Chapin and A. G. Boving as P. vandinei. This is very interesting and useful material, as it apparently represents the first association of the larva and adult of this species.

On the identity of Rhyacionia zozana (Kearf.).--There have recently been received, for identification, from W. Harry Lange, Jr., of the University of California, two moths (male and female) which Carl Heinrich tentatively placed in the genus Petrova. However, on the occasion of a visit to the American Museum in New York, Mr. Heinrich found these specimens to be Rhyacionia zozana Kearf., which has hitherto been known only from the single female type in the collection of that institution. R. montana Busck, known only from the male type, proves to be only a race or variety of R. zozana, in Mr. Heinrich's opinion.

First U. S. record for the calliceratid genus Plastomicrops Kieff.--Among certain minute Hymenoptera taken at Asheville, N. C., apparently in the course of soil sifting, and submitted for identification by Arthur P. Jacot, were three minute specimens which have been determined by C. F. W. Muesebeck as Plastomicrops n. sp. Plastomicrops is a rather remarkable genus of Serphoidea belonging to the family Calliceratidae and known only from the species P. acuticornis Kieff., which was described from Italy and has not been known to occur elsewhere. The habits of the group are unknown. The species will probably be found to be parasitic in some small soil-living insect.

Another U. S. record for a European parasite of grain-stem sawflies.--In the March number of the News Letter (vol. 3, no. 5, p. 25, May 1, 1936) there was reported the rearing of two specimens of the European braconid parasite Microbracon terebella (Wesm.) from Trachelus tabidus (Fab.) at Adamsville, Pa. Since then three additional specimens of the same parasite were submitted for identification by E. J. Udine, of the Carlisle, Pa., laboratory of the Division of Cereal and Forage Insects. These specimens were reared from Cephus pygmaeus L., at Shelby, Orleans County, N. Y. These records indicate the definite establishment of this grain-stem sawfly parasite in the United States.

Pine-infesting coccid discovered in the Southwest.--The trip to Arizona made by Harold Morrison in April and May for the purpose of examining infestations of the coccid Matsucoccus associated with twig blight on ponderosa pine, resulted also in the discovery of a very interesting related, although generically distinct, form on Pinus monophylla and P. edulis.

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